

# PRODUCTS THAT CHALLENGE THE PERFORMANCE OF ONSITE SYSTEMS:

## IMPACTS AND ALTERNATIVES

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[sheger@umn.edu](mailto:sheger@umn.edu) - October 6, 2017



National Onsite Wastewater  
Recycling Association



**What's New With NOWRA?**



# Goals & Mission

*To strengthen and promote the onsite and decentralized wastewater industry through activities that support recognition and promotion of professionalism for industry practitioners.*





**Advance the Science  
and Technology**

# Education and Training

As

People Caring About Water

NowRA

# Hands-On



# Training



# Associations

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# Online Learning Academy

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National Onsite Wastewater  
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## Welcome to the NOWRA Online Learning Academy

Whether you are new to the onsite/decentralized industry or continuing your professional development, you have come to the right place! Taught by experts in the industry, NOWRA's Academy offerings cover the fundamentals of the profession as well as advanced training in multiple topics. Offerings include those developed from a national perspective and those meeting specific state requirements. The courses included can be taken at a discounted rate as a **Member** or at a higher rate as a Nonmember of NOWRA. You can become a member of NOWRA through one of its state affiliates or if one does not exist in your area directly through NOWRA. More information can be found at: [NOWRA Membership](#).

### Our Mission

*To strengthen and promote the onsite and decentralized wastewater industry through activities that support recognition and promotion of professionalism for industry practitioners; implementation of best management practices throughout the industry that provide sustainable wastewater infrastructure solutions; achieve greater public awareness of the economic, environmental, and public health benefits of onsite and decentralized facilities; and to serve the public interest.*

### Who We Are

The National Onsite Wastewater Recycling Association (NOWRA) is the largest organization in the U.S. dedicated to educating and representing members within the onsite and decentralized industry. Our members include educators, regulators, engineers, contractors, manufacturers, suppliers, service providers, and other parties in the protection of North America's water resources and the environment. All segments of the industry are represented on NOWRA's Board of Directors that provide broad perspectives to promote and sustain our industry and service to the public. NOWRA headquarters is located in Alexandria, Virginia, with local constituent groups throughout the U.S. and Canada.

NOWRA was founded in 1992 to educate and serve its members and the public by promoting sound federal, state, and local policies, to improve standards of practice, and increase public recognition of the need for and benefits of onsite and decentralized wastewater infrastructure. Decentralized systems provide effective and more affordable wastewater treatment solutions where traditional central sewerage systems might be impractical or unsuitable. These systems can sustainably serve a single home, a neighborhood, or an entire community including commercial and industrial facilities.

# Online Training – nowra.org



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## Online Learning Academy

### New! A Convenient New Option to Get the Education You Need

Whether you are new to the onsite/decentralized industry or continuing your professional development, you have come to the right place! Taught by experts in the industry, NOWRA's Online Learning Academy offerings cover the fundamentals of the profession as well as advanced training in multiple topics.

Initially four training courses are being offered, each developed from a national perspective. NOWRA intends to add more courses in the coming months, and we expect many of NOWRA's affiliated state onsite associations will also be offering courses which meet specific state training requirements.

<p><b>A → Z</b> 8 hr Overview</p> <p>NOWRA's A to Z 8 Hour Overview</p> <p>This national course has something for everyone - from the local sewer inspector on to the national local inspector focusing on the needs of decentralized systems.</p>	<p><b>A → Z</b> 3 hr Intro to Onsite &amp; Wastewater</p> <p>Introduction to Onsite and Wastewater</p> <p>This is a great first course to introduce septic professionals on the basics of onsite wastewater treatment and wastewater priorities highlight hydraulic &amp; organic.</p>	<p><b>A → Z</b> 1 hr Operation and Maintenance</p> <p>Operation and Maintenance</p> <p>This module focuses on the experience of operators and Maintenance (O&amp;M) and the primary activities of a service provider with conventional systems.</p>
<p><b>A → Z</b> 4 hr Soil Evaluation, Treatment, &amp; Dispersal</p>		

Find a Septic System Professional  
In Your Area

NOWRA's Septic Locator



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water technologies

NOWRA is currently working with its state partners to get CEU approval for these courses so that you, as a practitioner, can obtain the credits you need to maintain your business license or certification. As approvals are received we will post them in this section.

# Online Training – nowra.org



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# Action With Federal Regulators

Adding the “sewer or septic” question to the US Census American Community Survey



**EPA**



# Lobbying Objectives

1. Increase market share 30% to 35%
2. Secure a larger share of existing federal funding
3. Get EPA to change policies

# Services



Roe D Hoe



Homeowner Financing



Education



Annual Conference

Mega-Conference,  
Mega-Success  
**P.6**

NOWRA Casts  
Doubt on Technical  
Paper  
**P.8**

New Opportunities  
in the Industry  
**P.11**

Meet NOWRA  
Member, Doug  
Jacko  
**P.14**

The official publication of the National Onsite  
Wastewater Recycling Association

# THE Onsite Journal

Spring 2016



## Once It's Installed, Then What?

New online tool puts custom owner guides into the hands of the wastewater community.  
Read more on page 9.



# Print and Social Media



# Other Benefits

Septic Locator  
Discounts  
Insurance

HOME | ABOUT NOWRA | HOW SEPTIC SYSTEMS WORK | RULES, REGULATIONS & CONTACTS | SEPTIC PROFESSIONALS LOGIN | SIGN UP

National Onsite Wastewater Recycling Association's  
**SEPTIC LOCATOR**

**NOWRA**  
National Onsite Wastewater Recycling Association

search this site...

Click here to search for a septic systems professional in your area who offers the services you need

### Find a Septic System Professional

Click on the link below to find a Septic System Professional in your area. There are several ways to search. You can input your zip code and specify the search distance radius. You can input your city and state and then specify the search distance radius. Or, you can look for a specific individual. In all cases you can narrow your search by specifying the types of services which you are seeking. The search results provide contact info and an info request widget.

[Search for a Professional Now](#)

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### All About Septic Systems

How much do you know about your septic system? If your answer is "Not very much," you have come to the right place. In the links above you can find out virtually anything you might want to know about it. The links will tell you how septic systems work, why it is important to maintain them properly and the specific things you should do to ensure they are well maintained. You can also learn about what you should do when a problem occurs, along with a list of potential problems you might face when operating an onsite wastewater treatment system (another name for a septic system), how they can be addressed, and guidelines for selecting an onsite wastewater contractor.

### Rules, Regulations and Contacts

Septic Systems are regulated in most states at both the state and local levels. Regulations at the state level typically represent the minimum standards and requirements for owning, operating, designing, installing and maintaining septic systems. State level requirements are often amended at the local health department level (typically a county or city/town). The local regulations are intended to supplement the state regulations, usually by adding requirements which reflect local conditions. The links above will take you to the official state website governing onsite wastewater. Many will also direct you to the local jurisdictions in their state.

### Industry Professionals! Login Sign up!

If you are a current member of NOWRA or one of its affiliated state organizations you are automatically included in the Septic Locator. Log in to manage your account – update contact information, add a description of your services or perhaps a include your website address.

Can't find your name on the Septic Locator? For a modest annual fee you can sign up to participate in this online directory. For less than 20 cents per day, you can be where your new customers are searching for providers like you who can help them with their problem!

# 2017 ONSITE MEGA



Dover Hotel

DELAWARE

DOVER OCT.

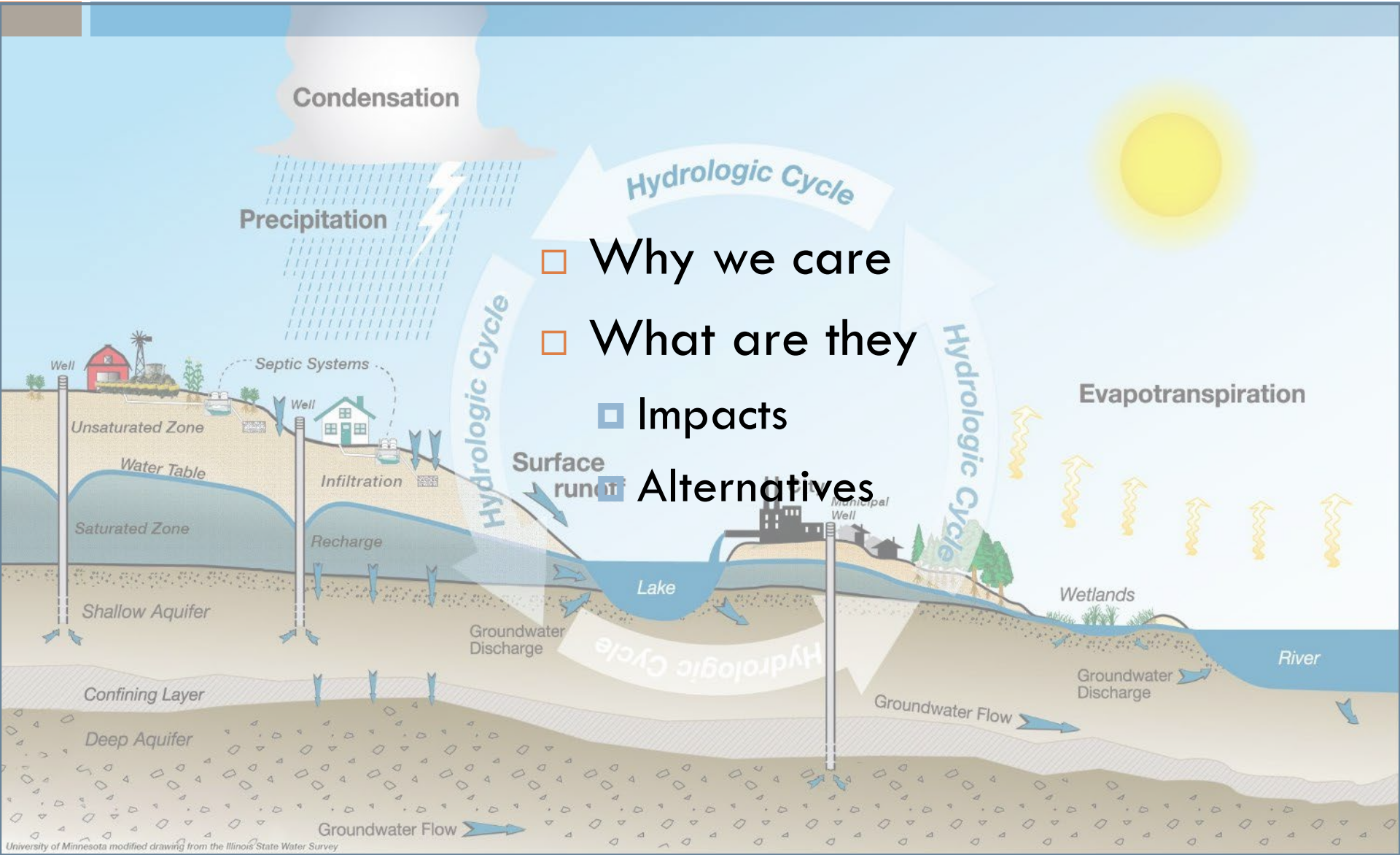
# UMN Onsite Program



## Water Resource Center, Onsite Sewage Treatment Program (OSTP)

1. Education for Professionals started in 1974
2. Education for Homeowners & Small Communities started in early 1990s
3. Ongoing research and demonstration supporting educational efforts

# Presentation Overview



- Why we care
- What are they
- Impacts
- Alternatives

# Products – Why Do We Care?

- Impact to the environment and public health
- Impacts to systems



# Bacteria - You May Not Like Them

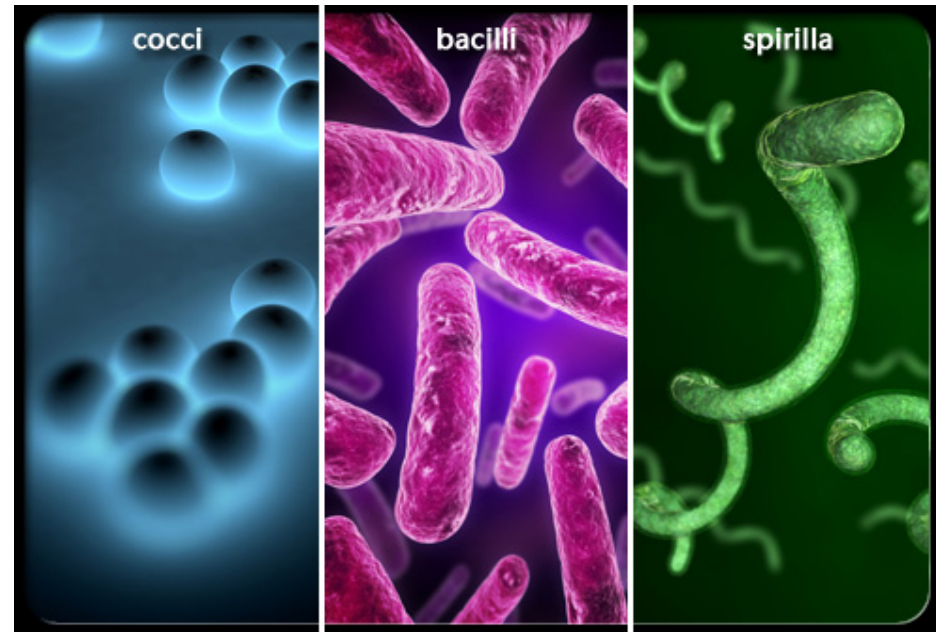
- But we need these guys
  - ▣ bacteria and fungi are the workhorses of wastewater treatment
  - ▣ they prefer their carbon source to be non-toxic



Illustration: Don Smith

# They are Exposed to Everything we Put Down the Drain

- The good news
  - ▣ Most waste organic compounds can be degraded by the microbes
    - in the septic tank
    - in the soil
- The bad news
  - ▣ there are plenty of organic compounds that will kill them



# Chemicals of Emerging Concern (CECs)

- Those previously unidentified due to advances in analytical techniques
- Those previously identified but with new effects of concern
- Newly marketed chemicals
  - ▣ Examples: antibiotics, hormones, psychoactive drugs, lipid regulators, pain relievers, fragrances, chemotherapy drugs, fire retardants, cleaning products, etc.



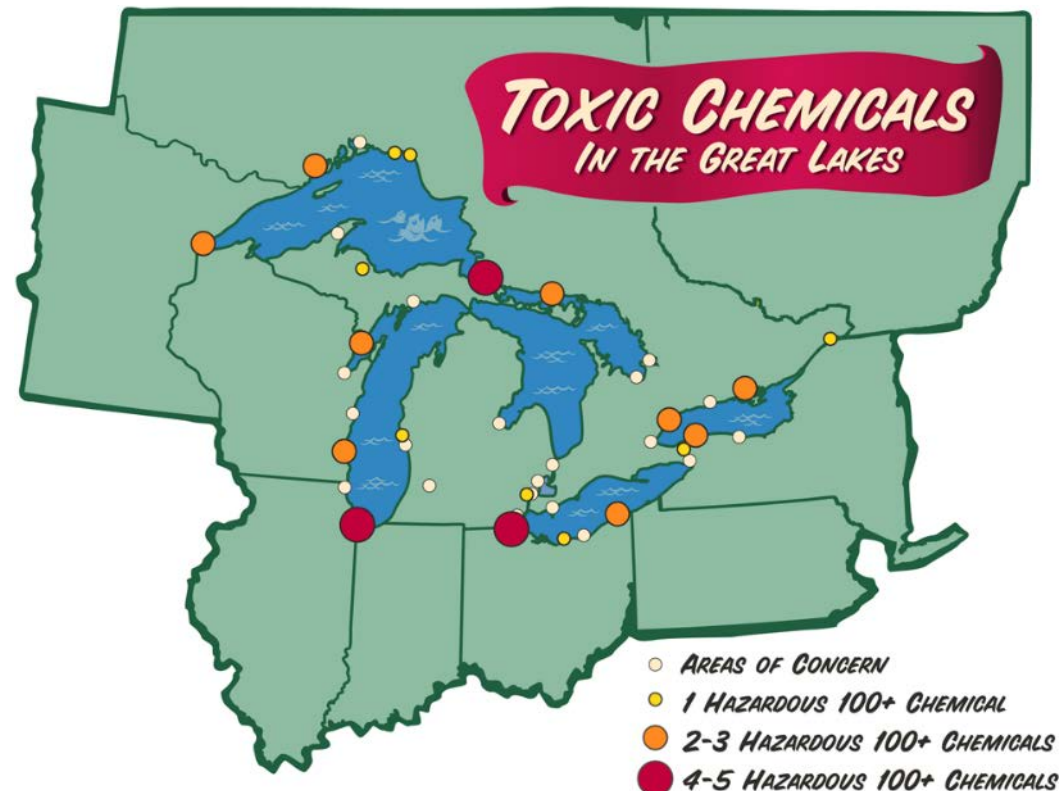
# Surface Water Study

- Sampled downstream of urban areas, intense livestock areas, wastewater systems
- Sampled for 95 CEC
- 139 streams, 30 states
- 82 of 95 detected
- 80% of samples were contaminated

# CEC Units Results

- Nanograms/liter
- 1 part per trillion
- 1 ng/l Analogy –  
1 oz. in 7.5 billion  
gallons of water

<http://bit.ly/2dy6BP7>





# Organic Contaminants in US Surface Waters

# Tap Water Evaluation

- 19 utilities serving 138 million people
- 2006-07
- Sampled for 55 chemicals – found 11 most frequently at levels  $<10$  ng/L
- Atrazine found  $\sim 40$ -50 ng/L



# Survey of 19 US Drinking Water Utilities

Top 11 of 55 compounds

Median concentrations generally <10 ng/L

- **Atenolol** - betablocker
- **Atrazine** - herbicide
- **Carbamazepine** - anticonvulsant
- **Estrone** - hormone
- **Gemfibrozil** - antilipidemic
- **Meprobamate** - antianxiety
- **Naproxen** - anti-inflammatory
- **Phenytoin** - anticonvulsant
- **Sulfamethoxazole** - antibiotic
- **TCEP** - flame retardant
- **Trimethoprim** - antibiotic

# ...and where do they come from?

- Personal care products
- Detergents
- Industrial discharge
- Residential wastewater
- Agriculture



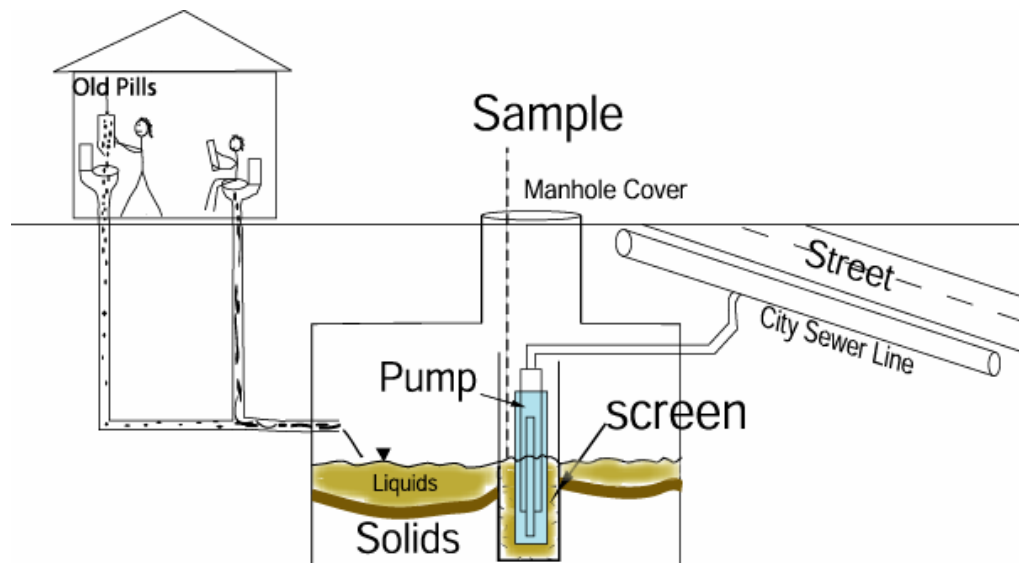
# Prescriptions Drugs

- Average American fills 12 prescriptions each year
- On average, people age 45 and older say they take four prescription medications daily



# Antibiotics and Similar Meds

- ❑ Antibiotics are not selective in which bacteria are killed
- ❑ While antibiotics help a patient by killing harmful bacteria, the medicine often kills good bacteria also
- ❑ Recommendations: Use them only when needed, dispose of unused ones properly (Do NOT flush)





# We're not the Only Drug Users

Drug residues are excreted in the manure and left in the Environment



# CECs Accumulate in Wastewater

- Wastewater Effluent
  - Estradiol & Birth Control Pills
  - Nonylphenol from detergents
  - Bisphenol A and phthalates from plastics
  - Triclosan from household cleaners
  - Musks from personal care products



# An Example - Consumer Products

- Ingredients in shampoo
  - 1% pyriothone zinc, ammonium laureth sulfate, ammonium lauryl sulfate, sodium lauroyl sarcosinate, glycol distearate, sodium sulfate, fragrance, dimethicone, DMDM hydantoin, disodium phosphate, sodium phosphate lauryl alcohol, PEG-12, polyquaternium-10, sodium chloride
- It goes down the drain



# For Example - Triclosan

- Forth National Report on Human Exposure to Environmental Chemicals
- CDC (2003-2004)
  - ▣ 2,517 people studied
  - ▣ 75% had triclosan detected in their urine
- Did not suggest harm – it just suggested that it was in their bodies

# Contaminants of Emerging Concern Treatment in Shallow Soil-based Septic Systems

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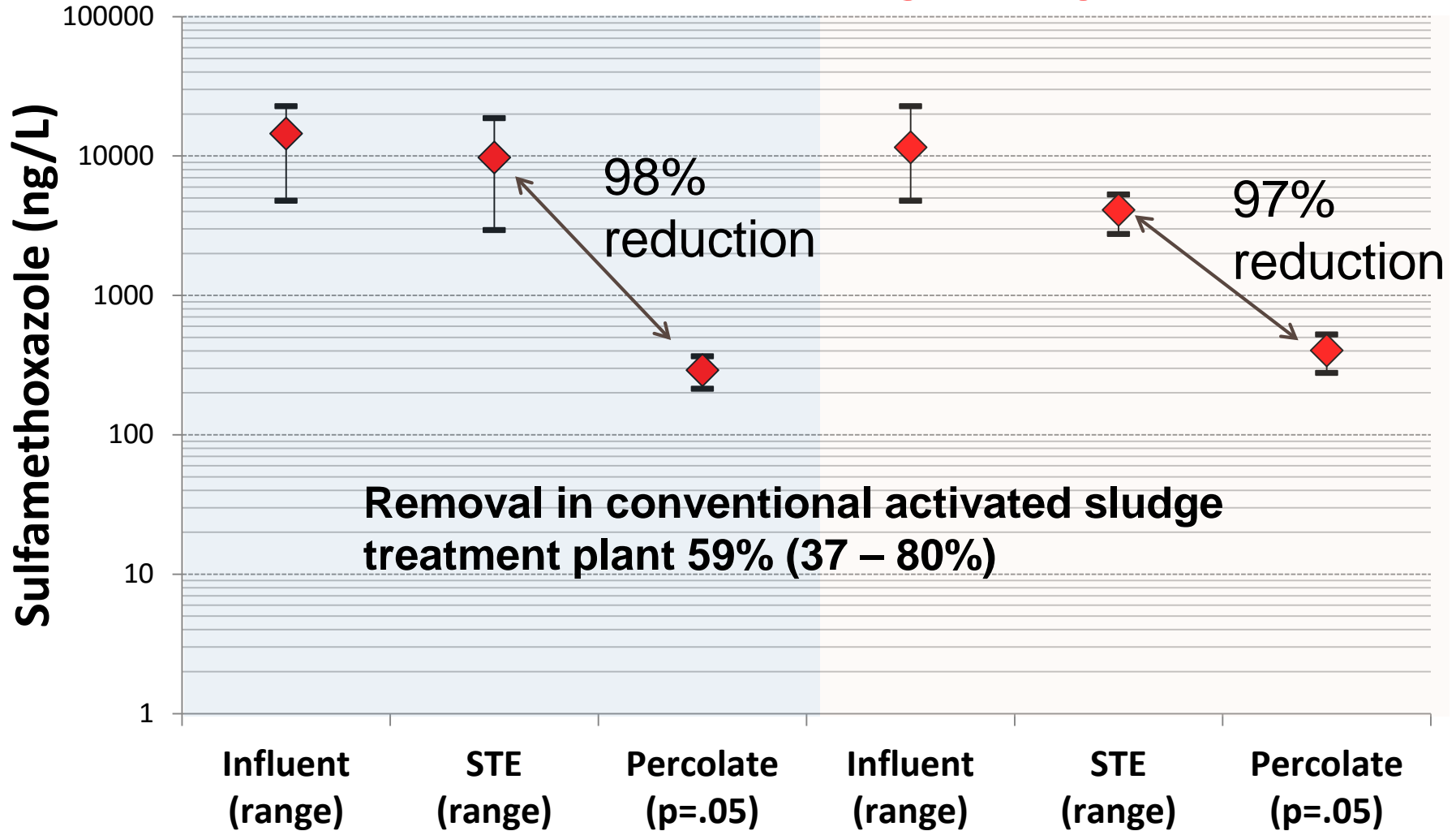
*This project was funded by the Massachusetts Department of Environmental Protection with additional funds from the United States Environmental Protection Agency under a Section 319 competitive grant. The contents of this report do not necessarily reflect the views or policies of the departments mentioned nor does the mention of any product trade name constitute an endorsement.*

# Antibiotics

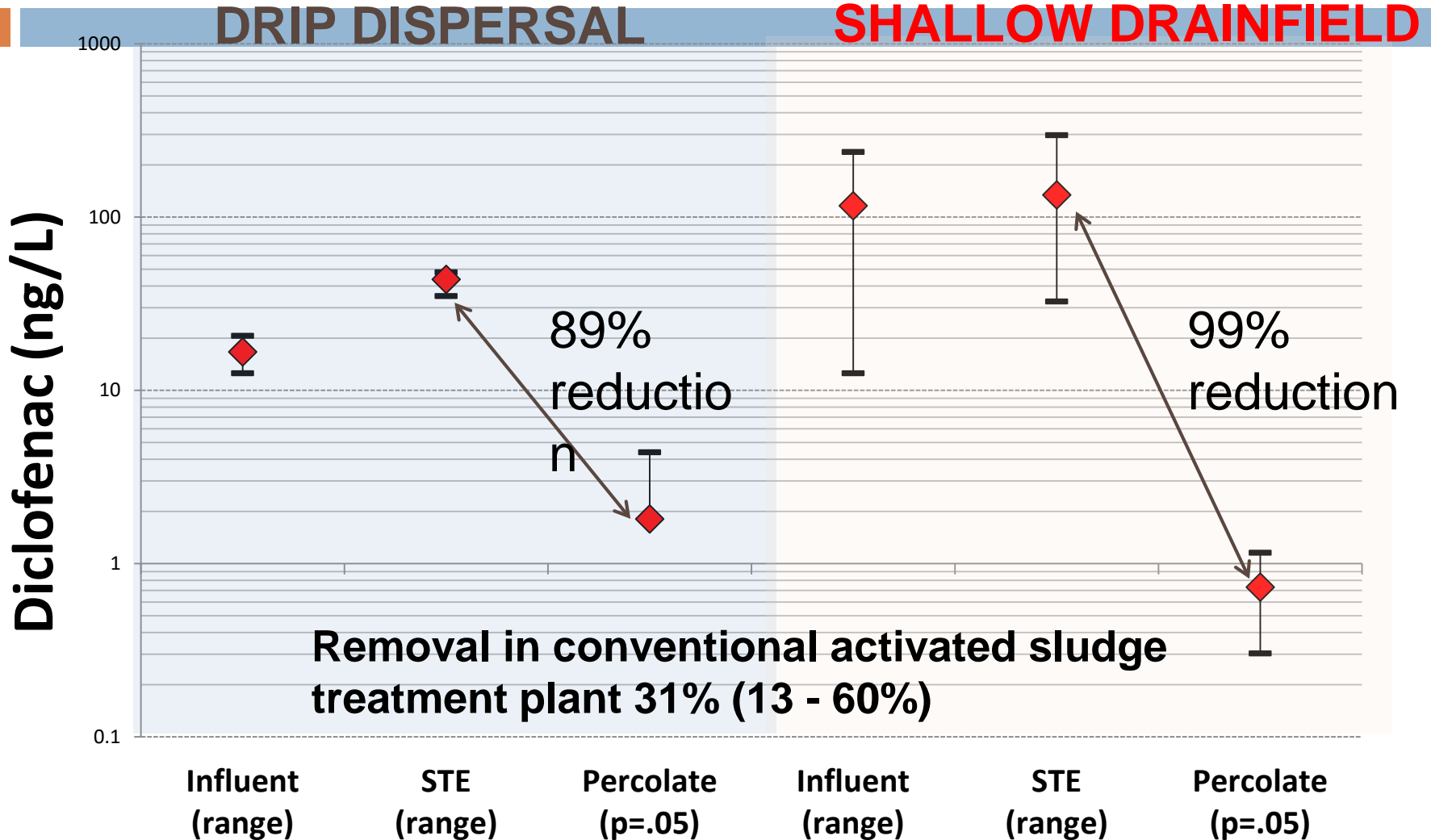


DRIP DISPERSAL

SHALLOW DRAINFIELD



# Nonsteroidal Anti Inflammatory Drugs

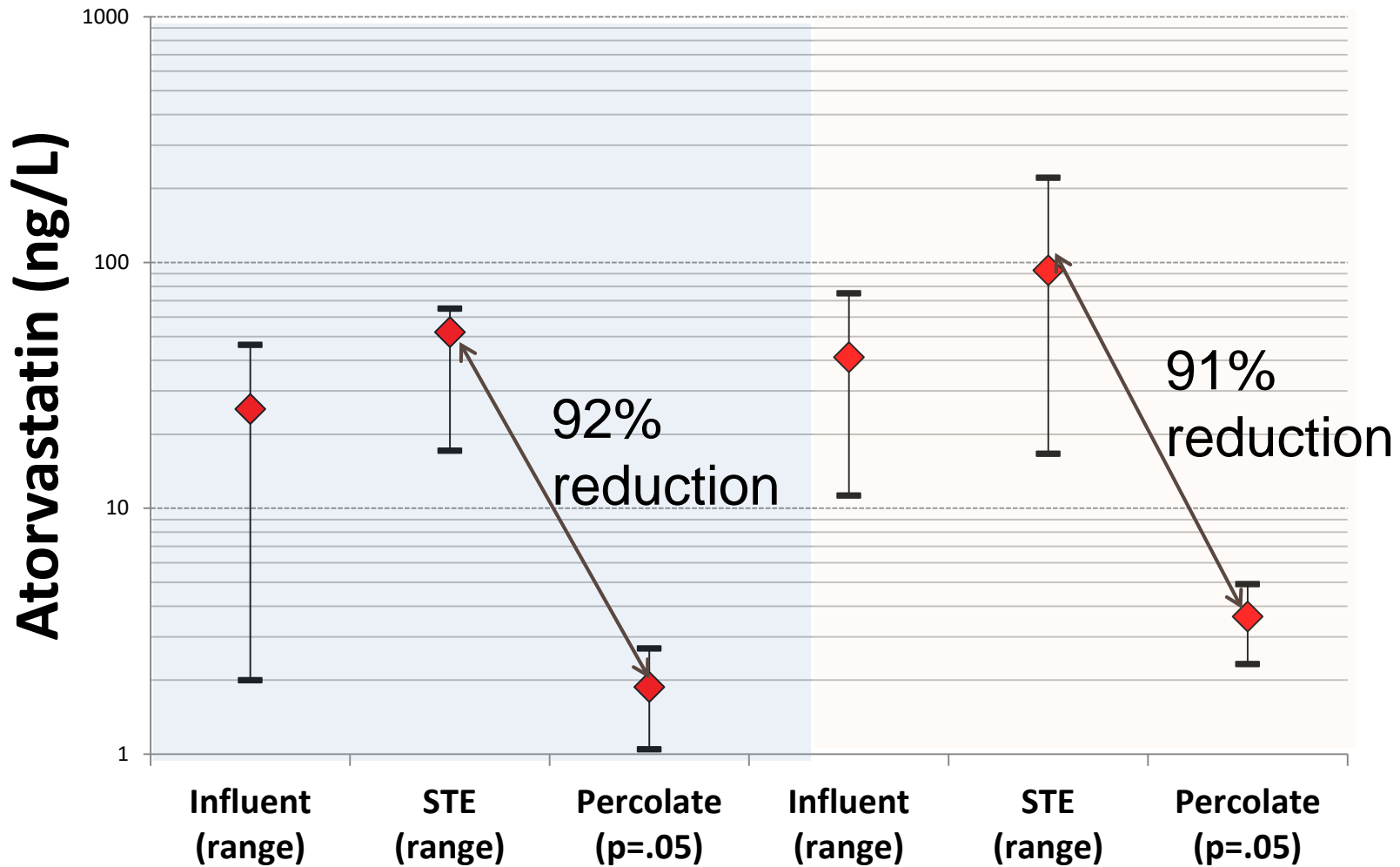


# Lipid regulating drugs



DRIP DISPERSAL

SHALLOW DRAINFIELD





Compound	Drip	Shallow Drainfield	Conventional activated sludge treatment
Acetaminophen	99.99%	99.82%	> 90% - 99.9% (b)
Atenolol	93.62%	99.03%	5.5% ( 2-20%)(a)
Atorvastatin	92.60%	91.18%	85-95% (d)
Caffeine	99.97%	99.93%	94.9% (c )
Ciprofloxacin	97.96%	98.17%	72% (59-85%)(a)
DEET	98.45%	98.24%	69% (48-90%) (e )
Diclofenac	89.16%	99.37%	31% (13-60%)(a)
Furosemide	97.60%	98.40%	59.8% (c )
Ibuprofen	99.94%	99.93%	74%(44-100%)(a)
Miconazole	0.00%	0.00%	
Naproxen	99.50%	96.80%	75% (59-92%)(a)
Propranolol	71.20%	96.89%	96% (a)
Sulfamethoxazole	97.90%	96.50%	59% (37-80%)(a)
TCEP	0.00%	0.00%	
Trimethoprim	99.20%	99.80%	14% (0 - 40%)(a)

# Take Home Message about CECs

- Many pharmaceutical and personal care products, contain compounds that can disrupt the normal functioning of hormones in humans and wildlife
- Although a major route for CEC entrance into the environment is wastewater, the septic systems present opportunity for significant treatment
- Shallow-placed soil absorption systems remove > 90% of many CECs found in household wastewater
- A more complete understanding of the principles of CEC removal in soils may offer opportunities to design optimization

EVALUATION OF ADULT FOSTER  
CARE AND ASSISTED LIVING  
SERVED WITH SEPTIC SYSTEMS IN  
MINNESOTA



# Background

- 6 foster homes owned by same individual had reported various issues with their septic system operation and performance, including:
  - ▣ surface discharge of wastewater and
  - ▣ premature system failure
- The systems evaluated are conventional systems with septic tanks followed by in-ground soil treatment areas or mound systems
- Septic tanks pumped annually

# Methods

- Six foster homes and one non-foster system (for comparison) were evaluated
- The foster homes were simply standard 3 or 4 bedroom homes that had been converted to a foster home and the control was a 4 bedroom residence
- Laboratory and field data collected from April through August 2013 (5 sampling events)
- All the systems were inspected to determine if they were properly designed, installed and maintained

# Methods

- *Water Usage* - staff who work in the facilities collected daily water meter readings for April–August 2013
- *Onsite Practices and Behaviors*
  - ▣ Staff provided feedback and assisted in completing a survey
  - ▣ Provided inventories for each site listing all pharmaceuticals and personal care products used in the facilities

# Wastewater analysis

- Samples obtained from outlet baffle of septic tank or pump tank
- Analyzed for:
  - Dissolved oxygen (DO), temperature and pH
  - 5 day biochemical oxygen demand (BOD5)
  - Total Kjeldahl nitrogen (TKN)
  - Total phosphorous (TP)
  - Total suspended solids (TSS)
  - Heterotrophic Plate Count (HPC)
  - Surfactants - Methylene Blue Active Substances (MBAS)
  - Contaminants of Emerging Concern (CEC)



# Results – Water usage

Site	Flow, gpd		
	Mean Ave. Recorded	70% of Design	Design
A. Maple View	321 ± 13	525	750
B. Shady Lane	462 ± 6	420	600
C. Woods	326 ± 22	420	600
D. Jocelyn	630 ± 19	525	750
E. Upland	521 ± 6	840	600/1200
F. Meadows	491 ± 23	525	750



# Results – water usage

- Flow was higher than the ideal operating maximum (70%) at 2 sites (3 if you take into account system that was expanded)
- None of the sites exceeded the maximum design flow (on average)
- **Recommendations:**
  - **Laundry**
    - All sites use top-loading washers.
    - 1 to 12 loads in a single day
    - Convert to front-loading laundry machines
    - Limit bleach usage
  - **Bathing, Washing, and Toilet Use**
    - None of the homes had low-flow showerheads or toilets
    - Convert to:
      - low-flow showerheads (<2.0 gal per minute, gpm),
      - sink faucets/fixtures (0.5–1.5 gpm), and
      - toilets (<1.6 gal per flush)

# Results - cleaning products

- Soap and detergents are often a significant part of maintaining a clean and hygienic home
- These cleaning products, however, can often stress septic systems when overused or disposed of improperly
- **Personal Care Products** - It would be prudent to reassess all cleaning products and personal care products
- Opting to use perfume- and dye-free alternatives will help cut down on unnecessary chemicals in wastewater

# Results – soaps and detergents

- Several antibacterial soap products and disinfectants are listed in the site inventories
- Some may be necessary (antibacterial denture cleaning tabs) while others (hand soaps and dish detergents) are not\*
- Replacing these products with non-antibacterial alternatives should reduce stress to the microbial communities and will not affect hygiene
- Not all troublesome products are labeled as antibacterial. Mouthwash and toothpaste brands with triclosan as an active ingredient should be avoided

\* Aiello, et al., 2007

# Results – disposable wipes

- During several site visits, non-biodegradable products were observed in the pretreatment tanks at 3 sites
- Recommendation – Remove from facilities and remind staff as well as guests wipes, personal wet-cloths, and moist towelettes are not suitable for septic systems
  - ▣ These should be disposed of with solid waste

# BOD<sub>5</sub> data

Site	BOD <sub>5</sub> , mg/L		
	Mean Ave.	Min.	Max.
A. Maple View	143 ± 31.0	80.8	166
B. Shady Lane	129 ± 12.4	110	147
C. Woods	193 ± 34.2	159	235
D. Jocelyn	144 ± 41.5	93.4	195
E. Upland	182 ± 49.9	119	244
F. Meadows	132 ± 64.9	48.7	191
G. Control Site	64 ± 30.7	38.6	114

# BOD<sub>5</sub> data analysis

- Woods and Upland had high average BOD<sub>5</sub> (>170 mg/L), indicating abnormally high strength waste\*
- The control site had unusually low average BOD<sub>5</sub>, although this is not necessarily of concern
- Assessing whether the BOD<sub>5</sub> is adequate for appropriate microbial growth in the soil treatment area should be considered within context of the overall carbon-to-nitrogen ratio (see TKN results next)
- All of these facilities prepare most of the meals for residents
  - ▣ Although these are not considered commercial kitchens the amount of food prepared is higher than most homes

# Impacts of surfactants on septic systems

Concentration (mg/L MBAS)	Potential Effects (Hernández Leal et al., 2011, and Weil-Shafran et al., 2006)
$\geq 1.0$	Risk of long-term accumulation of surfactants in soil, leading to decreased hydraulic conductivity and increased water repellence
10	Inhibition of hydrolysis, leading to greater accumulation of solids in anaerobic sewage treatment systems
30	Direct degradation of soil structure and decrease in hydraulic conductivity

# MBAS results (1 sampling event)

Site	Anionic Surfactants (MBAS), mg/L
A. Maple View	2.0
B. Shady Lane	0.76
C. Woods	3.8
D. Jocelyn	8.6
E. Upland	1.5
F. Meadows	3.4
G. Control Site	2.7

- 6/7 sites showed concentrations above the recommended 1.0 mg/L for soil treatment





# KIDNEY DIALYSIS AND SEPTIC SYSTEM IMPACTS

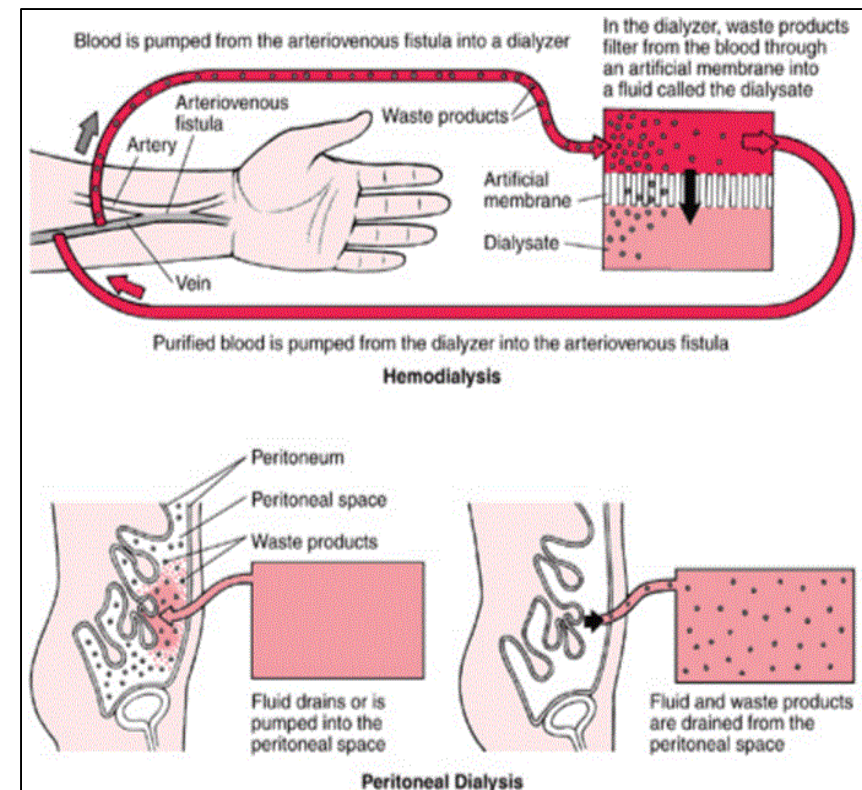
# Kidney Dialysis

- Dialysis is a treatment for kidney failure that removes waste and extra fluid from the blood, using a filter
- More than 661,000 Americans have kidney failure
  - 468,000 individuals are on dialysis
  - 50% doing it in their homes



# Two Types of Dialysis

- Hemodialysis (HD): Where blood is taken out of the body through a complex set of tubes, run through a filter called a dialyzer, cleaned off various impurities, and returned back to the patient
- Peritoneal Dialysis (PD): a synthetic tube is placed in the abdominal cavity which then allows dialysis by exchange of dialysis fluid at regular intervals



# Dialysis Impacts

- The effluent from both types of dialysis has been shown to damage septic systems and should not be discarded to septic systems
- It will add additional water and contaminants the septic system is not designed to treat/remove and can negatively impact the beneficial microbes needed to treat the wastewater



# Dialysis Impacts - HD

- Reverse osmosis (RO) reject water clean should be reused or applied to the surface
- Post dialysis effluent has a high concentration of sodium and chloride (over 3,000 mg/l for both)
  - ▣ Can alter, kill, or to cause unwanted and incorrect organism overgrowth in the septic tank and downstream and negatively impact concrete
  - ▣ Contains small amounts of glucose (1 mg/L reported by one company).
- Though the typical duration for individual patient varies, it is done every day with each individual session duration ranging from 3-6 hours is typical using around 100 gallons per week

# Dialysis Impacts - PD

- PD *influent* for the patient has a glucose concentrations ranging from 1.5 – 4.25% glucose (1.5gm/100ml of glucose = 15gm/L or 15,000 mg/L - 4.25% PD fluid contains 42,500 mg/L)
- Depending on the system, 40-50% of the glucose is absorbed by the patient so this generates BOD in the effluent
- PD is done every day for 6-8 hours with 6 cycles every day generating approximately 25 gallons per week of effluent.
- The high glucose content of PD effluent can also promote the formation of a co-polymer that can coat the surface of the soil and can block the lateral lines

# Dialysis Effluent – where should it go?

- Determine what kind of system are they using and request a report on the amount of RO water and effluent characteristics
- Currently many patients are told to drain their bags into the toilet and follow the effluent with a cupful bleach
- Check local regulations and preferably the effluent from dialysis should be discharge below the ground into a shallow rock pit or chamber

# Challenging Products and Alternatives






# Product Issues in General

- Problems
  - Sanitizing
  - pH impacts
- Antibiotic soaps and wipes are now used by 75% of American households
- Raises owner awareness
- They have cumulative effects on system performance

# What Do Labels Mean?

<b>Signal Word</b>	<b>Toxicity if swallowed, inhaled or absorbed through the skin</b>
<b>Caution</b>	One ounce to a pint maybe harmful
<b>Warning</b>	One teaspoon or one ounce maybe harmful or fatal
<b>Danger</b>	One taste to one teaspoon is fatal

Look out for words on labels and choose the least hazardous product.



<b>Less toxic</b>	<b>Caution</b>	mild/moderate
↑	<b>Warning</b>	moderate hazard
	<b>Danger</b>	extremely flammable corrosive or highly toxic
<b>More toxic</b>	<b>Poison</b>	highly toxic

# Cleaning Product Labels

- **POISON/DANGER:** Means the chemical will kill the bacteria, and its use should be minimized or eliminated
- **WARNING:** Means limited use should have a minimal impact on the system
- **CAUTION:** Typically means the product will have little effect

# Environmental Working Group



- Non-profit organization
- Has a comprehensive website which rates the full range of household products
- <http://www.ewg.org>
- A good resource to find the active ingredient in a product is:
- <http://householdproducts.nlm.nih.gov>

# Quaternary Ammonia

- Typically known as “Quats”
  - ▣ Many individual chemicals
  - ▣ Present in thousands of end-use formulations, many of which are blends of various Quats
  - ▣ Varying levels, some are worse than others
- Common uses include **disinfectants/sanitizers, surfactants, fabric softeners, antistatic agents, and septic tank additives (controls odor by killing bacteria)**

# Quats Impacts

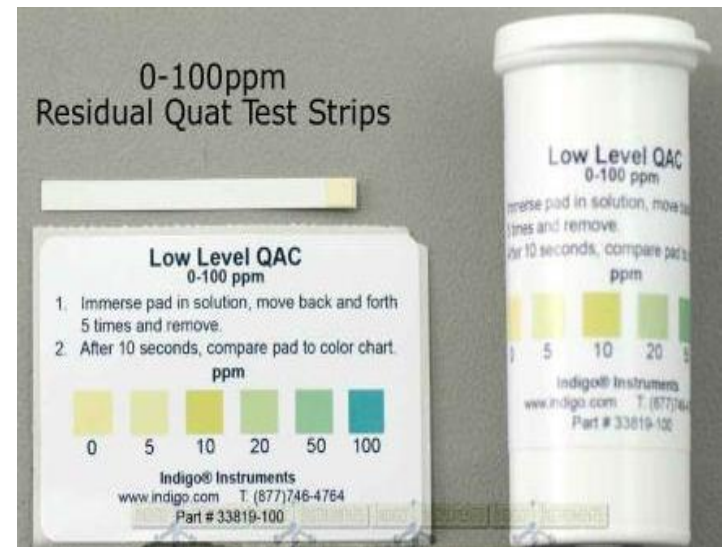
- Compounds are very stable and hard to break, so has long lasting biocidal effect
- Certain quats will biodegrade
  - ▣ Biodegradation poor under anaerobic conditions
  - ▣ Biodegradability of QACs under aerobic conditions
  - ▣ 90% removal cited in literature
- Anaerobic environments
  - ▣ Inhibitory at 5-15 mg/l
- Aerobic
  - ▣ Inhibitory at 10 – 30 mg/l for BOD
  - ▣ 2 – 5 mg/l for nitrification

# Quat Impacts Continued

- Gross study - Lysol concentration of 5.0 ml/l destroyed all the bacteria in the domestic septic tanks (2.5 days for recovery)
- Corresponds to 5.0 gallons of Lysol in a 1000 gallon septic tank
- Cumulative impact of these chemicals can impact system performance, especially in combination with other household products

# Testing Quats

- Quat test strips
- Most are used to test the concentration in commercial kitchen sinks at 200 mg/l
- Need one that can get down to 5 mg/l



<https://www.indigo.com>,

<http://www.lamotte.com/en/laundry-sanitation/test-strips/2934.html/>



# Quat Recommendations

- Avoid whenever possible
- In home disinfectant - Use borax: 1 / 2 cup in a gallon of water; deodorizes also (baking soda/vinegar too)



# Quat Recommendations Cont'd

- Commercial sanitizing is done by either a chemical or with high temperature (165°F)
  - ▣ Bleach/iodine preferred
  - ▣ Benefect botanical disinfectant (on EPA registered disinfectant list) which contains hydrogen peroxide that breaks down to water and oxygen
  - ▣ Many national or regional restaurant chains will not stop using Quats
    - For these sites, consider the use of NeutraQuat, a QAC neutralizer for wastewater systems ([hydrosolutions.com/](http://hydrosolutions.com/))

# Drain Cleaners

- Harsh chemicals used in many drain cleaners kill the essential bacteria
- Gross (1987) study found significant decreases in concentrations of coliform bacteria at very low Drano concentrations
  - ▣ 0.1 mg of Drano per liter of septic tank effluent reduced the concentration of coliforms ten-fold
  - ▣ 1.3 mg/l is enough to kill most bacteria
  - ▣ 3 mg/l they are completely destroyed
    - This amount would typically be used by a homeowner in a short time period while unclogging a drain

# Drain Cleaner Recommendations

- Use adequate catch basins in all drains from sinks, showers, tubs, laundry, etc.
  - ▣ Inexpensive metal or plastic drain screens
- When drains do plug usually in trap below sink
  - ▣ Take it apart, use a plunger or snake
- Call a professional
- DIY
  - ▣ Pour 1/2 cup salt and 1/2 cup baking soda down drain
  - ▣ Then, pour 6 cups of boiling water after it
  - ▣ Allow to sit overnight and then flush with hot water

# The Bathroom



# Bathroom Impacts

- Many toilet cleaners contain corrosive ingredients:
  - ▣ Sulfates, sodium hydroxide, sodium hypochlorite (bleach), or phosphoric acid
  - ▣ Antibacterial
- Tub and tile cleaners often contain:
  - ▣ Emulsifiers
  - ▣ Antibacterial, disinfecting and sanitizing products
- Rust removers contain very strong bases, emulsifier and surfactants

# Recommended Toilet Cleaners

- Sprinkle baking soda or Bon Ami, then scrub with a toilet brush
  - ▣ Bon Ami is non-scouring, biodegradable, nontoxic and hypoallergenic
- Lime and hard-water deposits can sometimes be removed with hot white vinegar



# What Should go in the Bowl

- ❑ Toilet paper
- ❑ No lotions
- ❑ No wipes
- ❑ Human waste
- ❑ Nothing else!





# Septic Safe?

- ❑ Even if items are marked as "septic safe" do not flush them
- ❑ For example, some wipes, toilet bowl cleaners and cat litter may be labeled this way
- ❑ In many instances it means they will flush

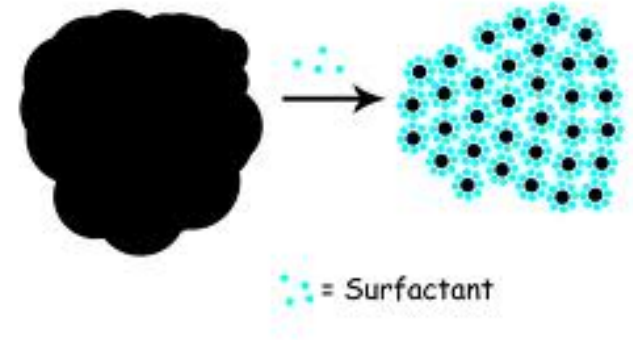


# Spray Shower Cleaners

- By spraying or at the push of a button the shower cleaner will spray a cleaning mist, and remove soap scum, mildew and other buildup from your shower walls
- Daily dose of sanitizer and emulsifier
- Recommendation: Sprinkle baking soda on a damp sponge or add 4 Tbs. baking soda to 1 qt. warm water or use Bon Ami



# Surfactants



- Soaps and cleaners that bubble
- Surfactants are found in almost all soaps because they help separate the soil or oily stains from the fabric, skin, etc.
- Two types
  - ▣ natural or oleochemical surfactants derived from plant oils such as palm or coconut oil
  - ▣ synthetic or petrochemical surfactants are derived from crude oil

# Laundry Soaps

- Typical laundry products contain petroleum based detergents and surfactants, enzymes, bleaches, optical brighteners, pH adjustors, processing aids, corrosion inhibitors, anti-redisposition agents, and fragrances
- Powdered varies also contain fillers – inert substances including clay that keep the powder flowing some as much as 50%
- Nearly all commercial brands of laundry soap leave chemical residues on your clothes

# Dishwashing Soap

- Dishwashing products may contain bleach, enzymes, and rinsing aids
- Some detergents still contain phosphorus
- Phosphorus is removed from wastewater by being chemically bound by minerals and held on exchange sites on soil

# Bathing and Handwashing

- In 2000, the American Medical Association issued the statement that **antibacterial soaps were no more effective against germs than common soap**
  - ▣ Although they initially kill more germs than soap, within an hour or so there is no difference in the numbers of germs that have repopulated the area
  - ▣ Use is promoting the developing of “**super**” bugs
- In September of 2016, the U.S. Food and Drug Administration issued a final rule eliminating the use of 19 specific active ingredients in antiseptic hand wash including triclosan
  - ▣ This rule does not affect consumer hand “sanitizers or wipes”, or antibacterial products used in health care settings

# General Surfactant Recommendations

- ❑ **Reduce the amount** - 50% of the recommended amount will usually work (particularly with soft water)
- ❑ Bar soap which does not contain an anti-bacterial agent is recommended as less product is typically used than liquid
- ❑ Free of scents, dyes, phosphorous and preservatives
- ❑ Free of antibacterial ingredients



# Liquid Fabric Softeners



- Coat the surface of a fabric with a subtle layer of slimy chemical compounds
  - Petroleum based
  - Contain Quats
  - Adds additional salts
  - Should not be used
  - Emulsification
- Recommendations:
    - Add a 1/2 cup of baking soda or vinegar or both
    - Drier balls
    - Anti-static- aluminum foil ball



# General Cleaning Recommendations

- Use non-chlorine, non-ammonia, non-antibacterial, non-toxic and biodegradable cleaning products
- Most all-natural cleaners are septic safe
- Use the least amount you need to get the job done
- When it comes to chemicals, it's a good idea to remember that if you only feel safe wearing gloves when you handle them, then it's a good bet that you won't want to put these items down your drain

# Potential Solutions

- Education
  - ▣ Eliminate as many of the issues as possible
- Management
  - ▣ More management may be needed
- Secondary treatment
  - ▣ Treatment breaks down many components



# Options

- Shock load
  - ▣ One time addition
  - ▣ Wait and see if it comes back or clean out and start over
- Short-term usage (<1 year)
  - ▣ Monitor tank
  - ▣ Holding tank if very upset
  - ▣ Manage
- Long term usage
  - ▣ Monitor
  - ▣ More maintenance needed?
  - ▣ Design in advanced treatment?

# Concluding Thoughts

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- As an industry (and public in general!), we need to keep educating users/customers
- The septic system and soil has a tremendous potential to capture trace organics
  - ▣ but it's not bulletproof
  - ▣ someday we may have to evaluate more contaminants



# QUESTIONS & MORE INFORMATION

septic.umn.edu

H2OandM.com

sheger@umn.edu

The screenshot shows the homepage of the Onsite Sewage Treatment Program website. At the top, there is a navigation bar with the University of Minnesota logo and the tagline "Driven to Discover". Below this is a blue header with the title "Onsite Sewage Treatment Program" and a menu with options like Home, Workshops, Research, Publications, etc. The main content area features a large image of a log cabin by a lake. To the left of the image, there is text describing the program's mission and the role of the OSTP team. Below the image, there is a "Staff" section listing Sara Heger and Dan Wheeler with their contact information. On the right side, there is a section for "Upcoming Workshops" listing two events: "10.1 Introduction to Onsite Systems" and "11.2.1 Installing Onsite Systems".

The screenshot shows the homepage of the H2O&M Community Septic System Owner's Guide website. The header features the H2O&M logo and the title "Community Septic System Owner's Guide". Below the header is a navigation bar with options like Home, Register, Sign In, and Help. The main content area is divided into two columns. The left column has two sections: "New Users" with a "Register Now" button and "Existing Users" with a "Login Here" button. The right column has a "Welcome to Community Septic: Owners Guide On-Line Tool" section with an "About This Tool" sub-section. The "About This Tool" section contains a list of bullet points describing the tool's features and limitations. At the bottom of the page, there is a footer with the University of Minnesota logo, the USDA logo, and text indicating that the tool is funded by the National Institute of Food and Agriculture and created by the University of Minnesota.